

REMARKS

Claims 29-31, 34-36, 39 and 44-48 are pending in this application. Claim 29 is the sole independent claim. Claim 29 has been amended to recite that the amount of the at least one member selected from the group consisting of amino group-containing silane coupling agent, hydrolysates thereof and polymers thereof is "50 to 500 ppm", which are the preferred lower and upper amounts as disclosed in the paragraph bridging pages 8 and 9 of the specification. Claim 29 has also been amended by deleting the term "base" and the term "said chemical conversion coat is formed via deposition of at least one member selected from the group consisting of hydroxide or oxide of zirconium, titanium and hafnium". Claim 48 has been amended to recite that the "metal material partially comprises iron, aluminum and zinc materials. The amendments to the claims do not introduce any new matter.

The objection to Claim 48 has been overcome by the above amendment to claim 48.

Claims 29-31, 34-36, 39 and 44-48 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Japanese Application No. JP 02-240295 (hereinafter also referred to as "JP '295") in view of U.S. Patent Publication No. 2001/0037748 to Shimakura and in further view of U.S. Patent No. 6,180,177 to Nagashima et al. (hereinafter also referred to as "Nagashima"). Claims 29, 31, 34-36, 39 and 44-48 stand rejected under 35 U.S.C. §103(a) as being unpatentable over JP '295 in view of Nagashima. Claim 30 stands rejected under 35 U.S.C. §103(a) as being unpatentable over JP '295 in view of Nagashima, and in further view of Shimakura. The cited references do not render obvious the present invention as recited in the claims, as amended.

In the present invention, the reason for limiting the content of the "at least one member selected from the group consisting of amino group-containing silane coupling agent, hydrolysates thereof and polymers thereof" (referred to herein collectively as "aminosilanes") to 50 to 500 ppm lies in the mechanism of the present invention.

In the present invention, the adhesiveness between the chemical conversion coat and the metal material, as well as the adhesiveness between the chemical conversion coat and the coating formed as an upper layer on the chemical conversion coat both become favorable because the

aminosilane included in the chemical conversion coating agent is incorporated into the chemical conversion coat. In addition, the adhesiveness is believed to result from the interaction of amino groups in the aminosilane with both the metal material and the upper layer coating (please see page 6, line 34 to page 7, line 20 of the specification). In this way, by using a chemical conversion coating agent including the aminosilane, the adhesiveness between the metal material, and the chemical conversion coat and coating can be made favorable.

However, in the prior art, when using such a chemical conversion coating agent, it was especially difficult to form a favorable chemical conversion film on the surface of an iron material as compared to other metal materials such as aluminum material and the like (please see page 15, lines 10-18 of the specification). Under these circumstances, the present inventors discovered that the concentration of an aminosilane included in a chemical conversion coating agent exerts great influence on the formation of a chemical conversion coat on the surface of an iron material, and thus achieved the present invention. The reason why the present invention makes it possible to form a favorable chemical conversion coat on the surface of an iron material is as follows.

The mechanism of the formation of the chemical conversion coat on the surface of the metal material, as disclosed at page 5, line 15 et seq. of the specification, is that first the surface of the metal material is dissolved (etched) by the chemical conversion coating agent which is acidic, leading to dissolution of metal from the metal material. Next, an oxide or hydroxide of zirconium (Zr-OH , Zr-O-) is precipitated on the surface of the metal material and forms a chemical conversion coat by the fluorine extract of ZrF_6^{2-} by the metallic ions arising in the solution and by an increase in the interface pH accompanying the dissolution. When the chemical conversion coating agent of the present invention containing an aminosilane is used in the process, the aminosilanes is coprecipitated when Zr-OH and Zr-O- are precipitated as a chemical conversion coat. Accordingly, in order to form a chemical conversion coating agent it is first necessary to etch the surface of the metal material.

In the present invention, as mentioned above, in order to obtain favorable adhesiveness both between the chemical conversion coat and the metal material, and between the chemical conversion coat and the coating formed on the surface of the chemical conversion coat, an

aminosilane is added to the chemical conversion coating agent. However, the present inventors have found that when the metal material is an iron material, a sufficiently favorable chemical conversion coat may not be formed by merely adding an aminosilane. The effect achieved by any given amount of a compound containing an aminosilane group is presumed to be related to the type of compound, and such a compound has a high affinity for surfaces of iron as can be understood from their use as anticorrosive agents for iron materials. In other words, adsorption of aminosilanes does not occur on the surface of a metal other than iron such as, e.g., an aluminum material; however, adsorption of aminosilanes is likely to occur on the surface of an iron material. If the aminosilane is present in a large amount in the chemical conversion coating agent, when the chemical conversion coating agent contacts the surface of the iron material, the surface of the iron material is considered to be covered by the aminosilane. In this case, the etching of the surface of the iron material is inhibited, and thus a favorable chemical conversion coat cannot be formed. In addition, when the amount of the aminosilanes is less than the lower limit, adequate adhesion to a coating cannot be attained. The mechanism showing the effect of different metal species of the material on the formation of a chemical conversion coat is shown in Fig. 1 attached to the Response.

Thus, in the present invention, in order to aim for the formation of a favorable chemical conversion coat on the surface of the iron material while maintaining adhesion between the chemical conversion coat and the iron material, and between the chemical conversion coat and the coating formed on the surface of the chemical conversion coat, the concentration of the aminosilane included in the chemical conversion coating agent is set to 50 to 500 ppm. By carrying out electrodeposition coating using such a chemical conversion coating agent, it is demonstrated in the Examples of the present specification that it is possible to impart sufficient corrosion resistance to an iron material. Namely, in Example 7 where the concentration of the aminosilane is 5000 ppm, the formed coating amount is 9 mg/m^2 , which is notably less compared to the other Examples where the concentration of the aminosilane is 50 to 500 ppm. Thus, it is clear from the disclosure of the present application that favorable chemical conversion coating can be carried out on an iron material according to the present invention. However, to provide additional evidence regarding this point, a Declaration under 37 CFR 1.132 to exhibit comparative experimental data that further verify these effects will be filed upon its completion.

As explained above, in consideration of the mechanism of the chemical conversion coat of the iron material, it is an important characteristic of the present invention to set the concentration of the aminosilane in the chemical conversion coating agent to 50 to 500 ppm. Further, by using a chemical conversion coating agent where the concentration has been set in this way, the remarkable effect can be obtained that it is possible to obtain an electrodeposition coating having favorable corrosion resistance even for a surface of an iron material.

In contrast, there is absolutely no suggestion in any of the cited publications to set the concentration of the aminosilane in the chemical conversion coating agent to 50 to 500 ppm in order to achieve the results obtainable by the present invention.

JP02-240295 fails to render obvious the present invention. JP'295 discloses no more than carrying out a pretreatment when electrodeposition coating an automobile, and this pretreatment has no relevance to the present invention. Thus, JP'295 makes absolutely no mention of the inclusion of an aminosilane in a surface treatment agent.

Shimakura (US2001/0037748A1) does not overcome the above discussed deficiencies of JP'295 with respect to rendering unpatentable the present invention. Shimakura discloses that in a surface treatment agent it is preferable to include a silane coupling agent, with a content of 0.01 to 100 g/L, (please see paragraph [0016]). This lower limit corresponds to 10 ppm. Shimakura discloses various types of silanes, which include amino-containing silanes along with those that are not amino-containing silanes. Shimakura also shows examples where silane coupling agent is one which contains amino groups. However, in the Examples disclosed in Shimakura which include an amino-containing silane, the content of the amino containing silane varies from 1.5 g/L to 90 g/L (Examples 1, 5, 7, 9 and 11). These amounts in the examples greatly exceed the claimed maximum content of 500 ppm. As discussed above, the upper limit of 500 ppm is important in achieving sufficient corrosion resistance on iron materials. Persons skilled in the art would not be led by Shimakura to first select amino-containing silane from the various possible silanes disclosed therein and then to select the amount thereof to be from 50-500 ppm and to expect with a reasonable degree of predictability that the results achievable by the present invention could be obtained.

Nagashima (US Patent 6,180,177 B1) does not overcome the above discussed deficiencies of JP '295 and Shimakura with respect to rendering unpatentable the present invention. Nagashima mentions the addition of a silane coupling agent to a surface treatment agent, but the amount is only provided as a weight ratio of the silane coupling agent and the water soluble polymer. Accordingly, Nagashima has no disclosure concerning setting the concentration of a silane coupling agent including an amino group in a surface treatment agent to 50 to 500 ppm in the case that the object of the treatment is an iron material. In addition, Nagashima discloses 4 types of silanes that are not amino-containing silanes. Persons skilled in the art would not be led by Nagashima to use 50-500 ppm of an amino-group containing silane and to expect with a reasonable degree of predictability that the results achievable by the present invention could be obtained.

Claims 32-33, 37-38 and 41-42 stand rejected under 35 U.S.C. §103(a) as being unpatentable over JP '295 in view of Nagashima, and in further view of Japanese Application No. JP 59-064781 (hereinafter also referred to as "JP '781"). The cited references do not render obvious the present invention as recited in the claims, as amended. JP '781 does not overcome the above discussed deficiencies of JP '295 with respect to rendering unpatentable the present invention.

The above discussions of JP '295 and Nagashima are incorporated herein by reference for linguistic economy. JP '781 discloses that the added amount of a silane coupling agent is 0.5 to 100 g/L. This lower limit corresponds to 500 ppm. However, there is no disclosure therein concerning setting the concentration of a silane coupling agent including an amino group in a surface treatment agent to 50 to 500 ppm in the case that the object of the treatment is an iron material in order to achieve the results obtainable by the present invention.

Claims 29, 31, 34-36, 39 and 47-48 stand rejected under 35 U.S.C. §103(a) as being unpatentable over JP '295 in view of U.S. Patent No. 6,203,854 to Affinito. Claim 30 stands rejected under 35 U.S.C. §103(a) as being unpatentable over JP '295 in view of Affinito, and in further view of Shimakura. Claims 44-46 stand rejected under 35 U.S.C. §103(a) as being unpatentable over JP '295 in view of Affinito, and in further view of Nagashima. The cited

references do not render obvious the present invention as recited in the claims, as amended. Affinito does not overcome the above discussed deficiencies of JP'295, Shimakura and Nagashima with respect to rendering unpatentable the present invention. The above discussions of JP '295, Shimakura and Nagashima are incorporated herein by reference for linguistic economy.

Affinito (US Patent 6,203,854 B1) discloses a content of an aminosilane in a treatment agent of 0.2 to 1 wt%. This lower limit corresponds to 2000 ppm. Thus in Affinito, there is no disclosure concerning setting the concentration of a silane coupling agent including an amino group in a surface treatment agent to 50 to 500 ppm in the case that the object of the treatment is an iron material in order to achieve the results obtainable by the present invention.

As explained above, the present invention, particularly by setting the content of the aminosilane in the chemical conversion treatment agent to 50 to 500 ppm, is capable of forming a favorable coating film on an iron material, while in contrast there is absolutely no mention of this in any of the cited publications. Accordingly, the present invention is not obvious from the inventions disclosed in each of the cited publications. As will be seen, Affinito discloses only corrosion resistance against aluminum materials, and corrosion resistance against iron materials is not referred to.

Concerning obviousness, *Graham V. John Deere*, 383 U.S. 1, 148 U.S.P.Q. 459 (1966) outlines the approach that must be taken when determining whether an invention is obvious. In *Graham*, the Court stated that a patent may not be obtained if the subject matter would have been obvious at the time the invention was made to a person having ordinary skill in the art, but emphasized that nonobviousness must be determined in the light of inquiry, not quality. Approached in this light, §103 permits, when followed realistically, a more practical test of patentability. In accordance with *Graham*, three inquiries must be made in determining whether an invention is obvious:

- (1) The scope and content of the prior art are to be determined.
- (2) The difference between the prior art and the claims at issue are to be ascertained.
- (3) The level of ordinary skill in the pertinent art resolved.

(4) Evaluating evidence of secondary considerations, such as commercial success, long felt but unsolved needs and failure of others, etc. Also see *KSR Int'l Co. v. Teleflex, Inc.*, 127 S. Ct. 1727 (2007).

Against this background, the obviousness or nonobviousness of the subject matter is determined. Secondary considerations, such as unexpected results, commercial success, long felt but unsolved needs, failure of others, etc., can be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented.

In conjunction with interpreting 35 U.S.C. §103 under Graham, the initial burden is on the Patent Office to provide some suggestion of the desirability of doing what the inventor did, i.e. the Patent Office must establish a *prima facie* case of obviousness. To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention, or the Patent Office must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references.

To establish a *prima facie* case of obviousness, three basic criteria must be met:

1. There must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference.
2. There must be a reasonable expectation of success.
3. The prior art reference (or references when combined) must teach or suggest all the claim limitations.

As mentioned above, the cited references fail to disclose all of the claims recitations and particularly the content of the aminosilane in the chemical conversion treatment agent of 50 to 500 ppm, for forming a favorable coating film on an iron material.

The mere fact that the cited art may be modified in the manner suggested in the Office Action does not make the modification obvious, unless the cited art suggests the desirability of

the modification or adequate rationale exists to do so. No such suggestion appears in the cited art in this matter nor has the requisite rationale been adequately articulated. The Examiner's attention is kindly directed to *KSR Int'l Co. v. Teleflex, Inc.*, 127 S. Ct. 1727 (2007); *In re Lee* 61 USPQ2d 1430 (Fed. Cir. 2002), *In re Dembiczak et al.* 50 USPQ2d. 1614 (Fed. Cir. 1999), *In re Gordon*, 221 USPQ 1125 (Fed. Cir. 1984), *In re Laskowski*, 10 USPQ2d. 1397 (Fed. Cir. 1989) and *In re Fritch*, 23, USPQ2d. 1780 (Fed. Cir. 1992).

Also, the cited art lacks the necessary direction or incentive to those of ordinary skill in the art to render a rejection under 35 USC 103 sustainable. The cited art fails to provide the degree of predictability of success of achieving the properties attainable by the present invention as discussed above needed to sustain a rejection under 35 USC 103. See *KSR Int'l Co. v. Teleflex, Inc.*, *supra*; *Diversitech Corp. v. Century Steps, Inc.* 7 USPQ2d 1315 (Fed. Cir. 1988), *In re Mercier*, 187 USPQ 774 (CCPA 1975) and *In re Naylor*, 152 USPQ 106 (CCPA 1966).

Moreover, the properties of the subject matter and improvements which are inherent in the claimed subject matter and disclosed in the specification are to be considered when evaluating the question of obviousness under 35 USC 103. See *KSR Int'l Co. v. Teleflex, Inc.*, *supra*; *Gillette Co. v. S.C. Johnson & Son, Inc.*, 16 USPQ2d. 1923 (Fed. Cir. 1990), *In re Antonie*, 195, USPQ 6 (CCPA 1977), *In re Estes*, 164 USPQ 519 (CCPA 1970), and *In re Papesch*, 137 USPQ 43 (CCPA 1963).

No property can be ignored in determining patentability and comparing the claimed invention to the cited art. Along these lines, see *In re Papesch*, *supra*, *In re Burt et al.*, 148 USPQ 548 (CCPA 1966), *In re Ward*, 141 USPQ 227 (CCPA 1964), and *In re Cescon*, 177 USPQ 264 (CCPA 1973).

In view of the above, consideration and allowance are respectfully solicited.

In the event the Examiner believes an interview might serve in any way to advance the prosecution of this application, the undersigned is available at the telephone number noted below.

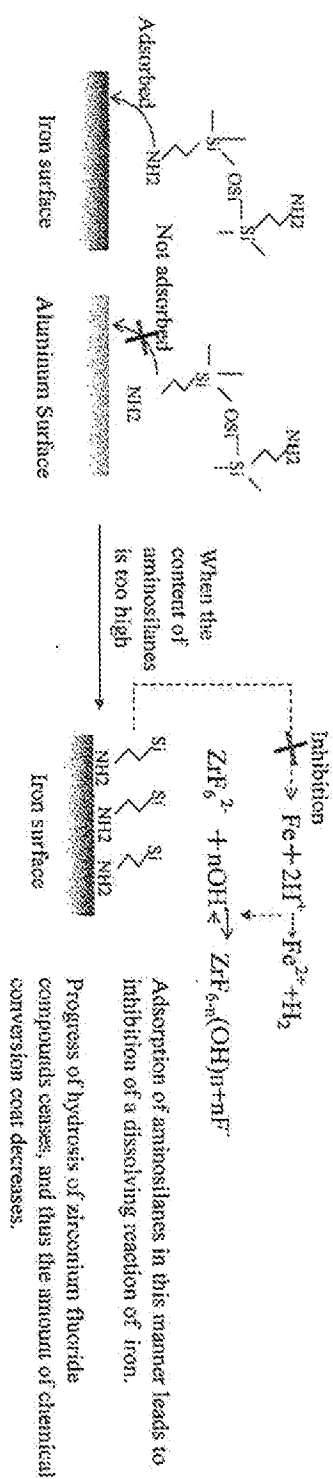
The Office is authorized to charge any necessary fees to Deposit Account No. 22-0185, under Order No. 27617-00003-US from which the undersigned is authorized to draw.

Dated: May 16, 2011

Respectfully submitted,

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Figure 1. Mechanism showing the effect of different metal species of the material on the formation of a chemical conversion coat by adsorption of aminosilanes



Affinito is directed to treatment of an aluminum material, and discloses that the content of aminosilanes is preferably no less than 0.2% by mass (no less than 2000 ppm).